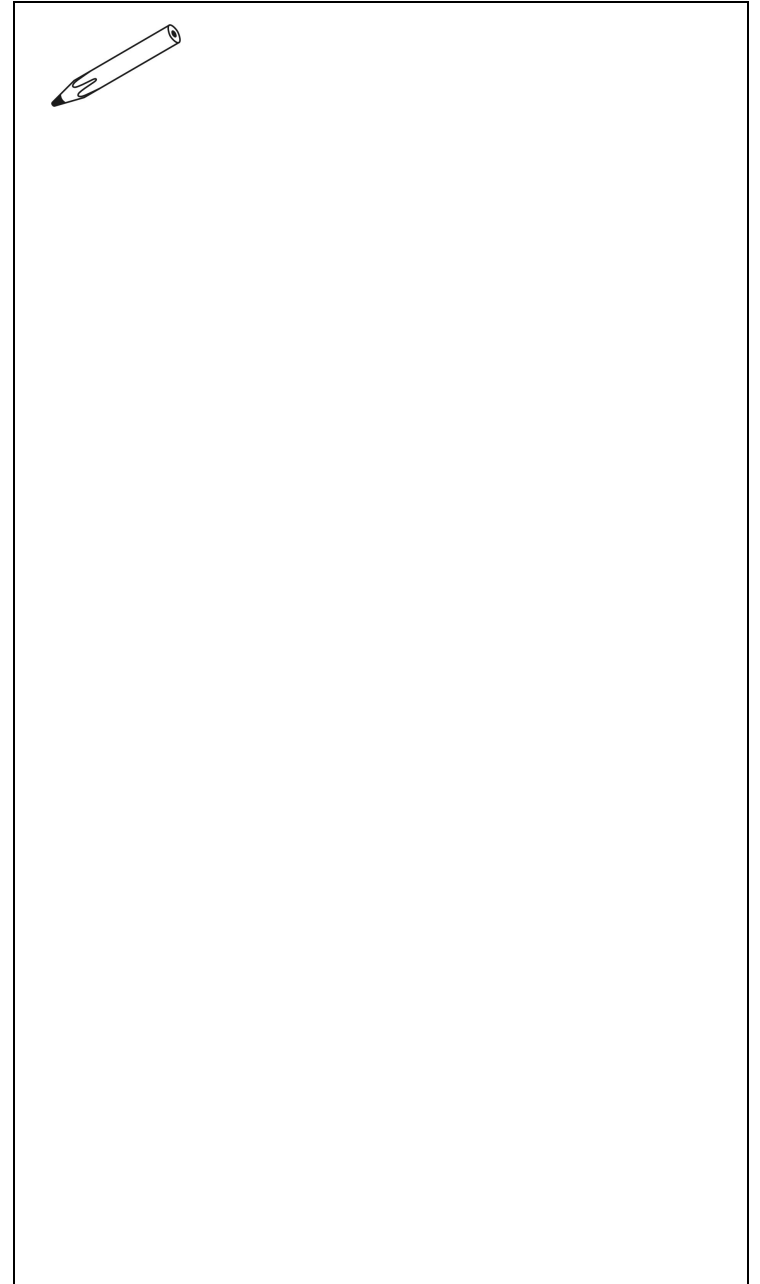


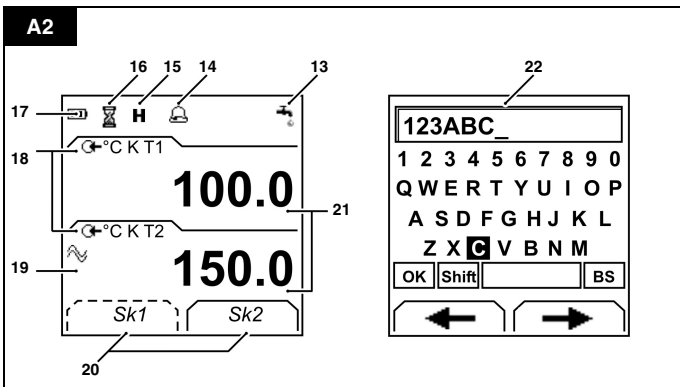
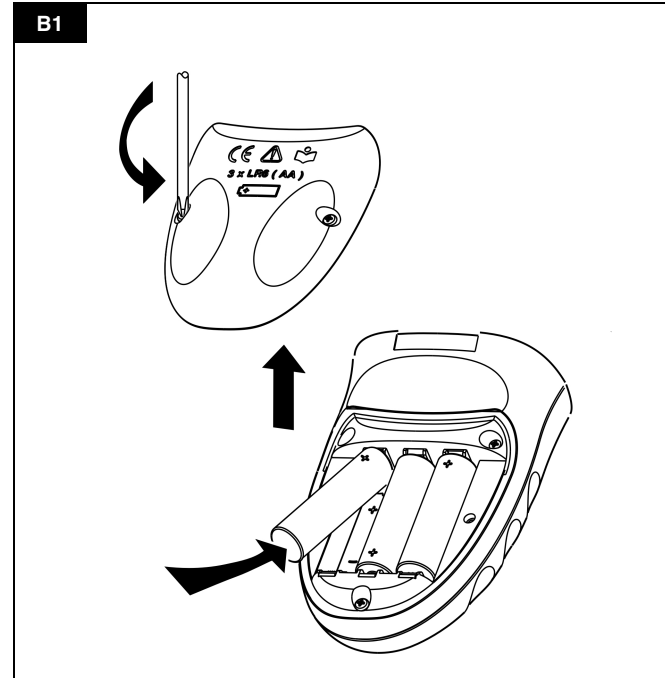
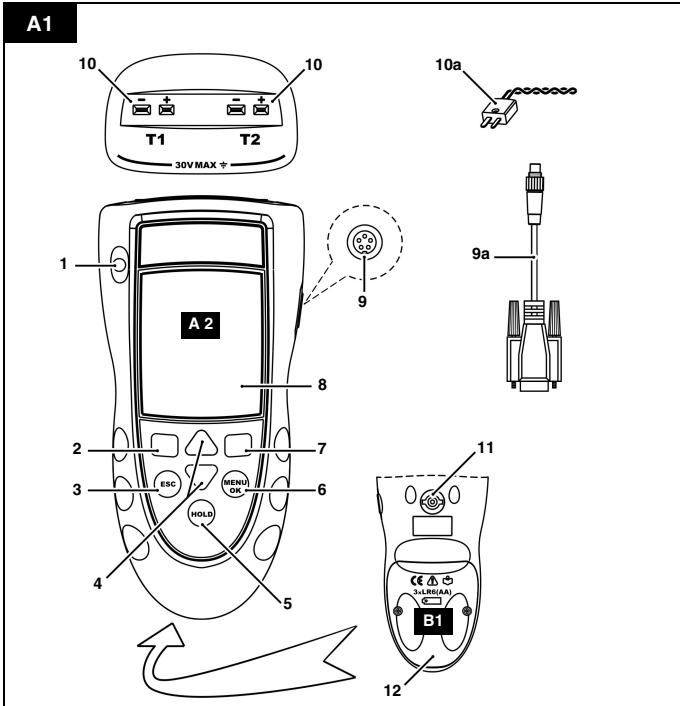


## *DPI 820*

*Dual Input Thermometer*

**User manual**





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## Introduction

The DPI 820 Dual Input Thermometer is part of the GE Druck DPI 800 series of hand held instruments.  
The DPI 800 series uses Intelligent Digital Output Sensor (IDOS) technology to give instant plug and play functionality with a range of Universal Measurement Modules (UMM).  
The DPI 820 includes these functions:

Function
* Measure temperature: T1 and/or T2
* Measure temperature difference: T1 - T2
* Cold Junction (CJ) compensation
Snapshot: Up to 1000 displays with a date/time stamp
Communications port: IDOS or RS232
Language selection
** Measure pressure/Leak test: UMM - Pressure
Other functions: Hold, Maximum/Minimum/Average, Filter, Tare, Scaled values, Backlight, Alarm

\* Refer to "Specification".  
\*\* Optional item

## Safety







Before you use the instrument, make sure that you read and understand all the related data. This includes: all local safety procedures, the instructions for the UMM (if applicable), and this publication.

Before you start an operation or procedure, make sure that you have the necessary skills (if necessary, with qualifications from an approved training establishment). Follow good engineering practice at all times.

### WARNING





- It is dangerous to ignore the specified limits for the instrument or to use the instrument when it is not in its normal condition. Use the applicable protection and obey all safety precautions.
- Do not use the instrument in locations with explosive gas, vapor or dust. There is a risk of an explosion.
- To prevent electrical shocks or damage to the instrument, do not connect more than 30V between the terminals, or between the terminals and the ground (earth).
- UMM - Pressure options only. To prevent a dangerous release of pressure, isolate and bleed the system before you disconnect a pressure connection.

### Safety - Marks and symbols on the instrument


















	Complies with European Union directives		Warning - refer to the manual
	Read the manual		Battery
	Ground (Earth)	<b>T1/T2</b>	Identifies the thermocouple connector
	ON/OFF		

## To start

### To start - Location of items **A1**

Item	Description
1. 	On or off button.
2. 	Left-hand soft-key. Selects the function above it on the display (Item 20). Example: Edit
3. <b>ESC</b>	Moves back one menu level. Leaves a menu option. Cancels the changes to a value.
4. 	Increases or decreases a value. Highlights a different item.
5. <b>HOLD</b>	Holds the data on the display. To continue, press the <b>HOLD</b> button again. Snapshot mode (Item 16): Records the data on the display.
6. <b>MENU OK</b>	Shows the <i>Select Task</i> menu. Selects or accepts an item or value. Selects [✓] or cancels [ ] a selection
7. 	Right-hand soft-key. Selects the function above it on the display (Item 20). Example: Settings
8.	Display. Refer to A2
9. <b>SENSOR/PC</b>	Communications port. Use to connect a Universal Measurement Module (UMM) or a RS232 cable.
9a.	Optional item - Part No. IO800D: RS232 cable (5-pin to 9-pin D type connector). Use to copy the snapshot records to a PC or to a printer. Refer to "Operation".
10.	Thermocouple connector: Refer to "Operation".
10a.	Type K thermocouple (two included).
11.	Connection point for some of the optional accessories. Refer to the datasheet.
12.	Battery compartment. Refer to B1.

### To start - Items on the display **A2**


Item	Description
13. 	UMM - Pressure only. Task indication for the leak test. <i>Refer to: Select Task (Table 2)</i>
14. 	The measured value satisfies one of the alarm conditions. <i>Refer to: Settings (Table 3)</i>
15. <b>H</b>	The data on the display is on hold. To continue, press the <b>HOLD</b> button again.
16. 	The snapshot function is set up to record the data on the display ( <i>Periodic or Keypress</i> ). <i>Refer to: Set Up (Table 1)</i>
17. 	Shows the battery level: 0 ... 100%.
18. 	Identifies the type of data: measurement range, units, thermocouple type (K, J, T ...), T1/T2 - If applicable.  = Input  = IDOS Input <i>Refer to: Select Task (Table 2)</i>
19. 	Shows the settings applied to the input (If applicable).  123ABC = x:y scaled value  = Filter  = Maximum  = Average  = Minimum  = Tare <i>Refer to: Settings (Table 3)</i>
20.	A soft-key function. To select an available function, press the soft-key below it. Example:  = Move left  = Move right
21.	The measured value or values applicable to the task selection.
22.	The <i>Edit</i> display to set up text labels ( $\leq 6$ characters): <i>Snapshot (Table 1), x:y Scaling (Table 3).</i> <b>OK</b> = Accept the new text label <b>Shift</b> = Change the keys: 123ABC or -_+abc  = Add a space <b>BS</b> = Back space (Delete character)

### To start - Prepare the instrument

Before you use the instrument for the first time:

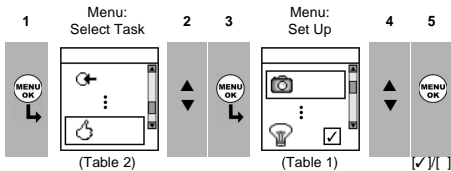
- Make sure that there is no damage to the instrument, and that there are no missing items.
- Remove the plastic film that protects the display. Use the tag (D) in the top right-hand corner.
- Install the batteries (refer to B1). Then re-attach the cover.

### To start - Power on or off

To turn the instrument on or off, press  (A1 - item [1]). The instrument does a self test and then shows the applicable data. When the power is off, the last set of configuration options stays in memory. Refer to "Maintenance".

**To start - Set up the basic operation**

Use the *Set Up* menu to set up the basic operation of the instrument.



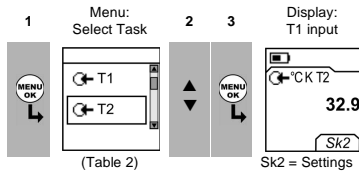
If there is additional data for a menu option, select *Settings* (■ ■) to see the values that are set up. If necessary, adjust the values.

Table 1: Menu options - Set Up

Options	Description
... Units	To select the temperature units (°C or °F).
... Units	<i>UMM - Pressure options only.</i> = "Pressure Units" if you select an IDOS task (Table 2). If applicable, select one of the fixed units of measurement (psi, mbar ... ).
	To set up and use the <i>Snapshot</i> functions. <i>Additional data:</i> Refer to <i>Operation</i> (Table 4)
... type	To select an applicable thermocouple type (K, J, T ... )
... Scale	To select the applicable international temperature scale: IPTS 68 or ITS 90.
	To select and set up the backlight facility + timer. <i>Additional data:</i> Select <i>Settings</i> (■ ■)
	To select and set up the power off facility + timer. <i>Additional data:</i> Select <i>Settings</i> (■ ■)
	To show the battery level (%).
	To set the display contrast (%). ▲ Increases %, ▼ decreases %
	To set the time + date. The calibration facility uses the date to give service and calibration messages. <i>Snapshot</i> adds a date/time stamp to each display.
	To set the language option.
	To calibrate the instrument. <i>Additional data:</i> Refer to " <i>Maintenance</i> ".
	To select and show the applicable status data (Software Build, Service History, Serial Number).

**To start - Select a task (Measure)**

When the instrument is set up (Table 1), use the *Select Task* menu to select the applicable task.



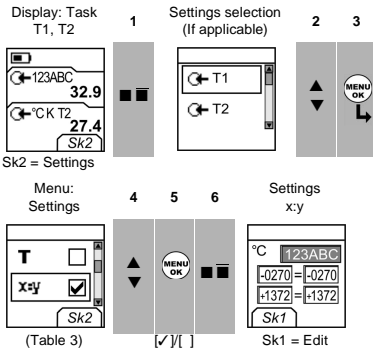
In Table 2, IDOS is a Universal Measurement Module (UMM). If you attach a UMM to the communications port (A1 - item [9]), the *Select Task* menu includes the applicable IDOS options.

Table 2: Menu options - Select Task

Options	Description
	Selects one temperature measurement task (T1, T2, T1-T2). T1-T2 gives the temperature difference.
	Selects two temperature measurement tasks (T1 and T2).
	<i>UMM - Pressure options only.</i> Selects the IDOS pressure measurement task.
	<i>UMM - Pressure options only.</i> Selects one temperature measurement task (T1, T2, T1-T2) + the IDOS pressure measurement task.
	<i>UMM - Pressure options only.</i> Selects the IDOS pressure measurement task + leak test.
	To set up the way the instrument works. <i>Additional data:</i> Refer to: <i>Set Up</i> (Table 1).

## To start - Set up the settings

When the task is set up (Table 2), use the *Settings* menu to adjust the input operation.



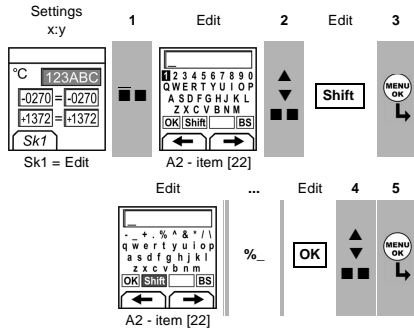
If there is additional data for a menu option, select *Settings* (■ ■) to see the values that are set up. If necessary, adjust the values. Refer to "Edit functions".

Table 3: Menu options - Settings

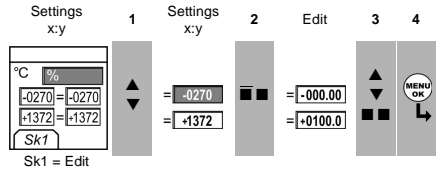
Options	Description
▲▼	To include maximum, minimum and average values for the measurement task (If applicable). Only available when there is one input measurement task.
T	To select and set up a tare value for the measurement task (a specified value or the reading on the display). The instrument subtracts a positive tare value, and adds a negative tare value. <i>Additional data:</i> Select Settings (■ ■)
X:Y	To select and set up a scale of values: One local scale for each measurement task (Maximum: 5). <i>Additional data</i> (Table 1): Select Settings (■ ■)
📉	To select and set up the filter values to give a smoother output for the measurement task: <div style="display: flex; align-items: center;"> <div style="text-align: center; margin-right: 10px;"> <math>\frac{+}{-}</math>  <math>\div</math> </div> <div>                     Band as a % of full scale (FS). The filter compares each new value with the previous value. If the new value is outside the band, it is not filtered.                       Low pass filter time constant in seconds.                      Increase the value to increase damping factor.                 </div> </div> <i>Additional data:</i> Select Settings (■ ■)
🔔	To select and set up the alarm values for the measurement task (maximum and minimum). <i>Additional data:</i> Select Settings (■ ■)
00	<i>UMM - Pressure options only.</i> Gage sensors or sensors with differential operation. A zero correction that makes the instrument read zero at local pressure.
🕒	Leak Test only. To set an applicable period for the leak test (Hours:Minutes:Seconds).

## To start - Edit functions

Example 1) Set up a label for x:y Scaling = %.



Example 2) Set up values for x:y Scaling = 0 to 100%.



## Operation

This section gives examples of how to connect and use the instrument. Before you start:

- Read and understand the "Safety" section.
- Do not use a damaged instrument.

### Operation - Thermocouple connections

Attach the thermocouple wires to the applicable thermocouple mini-connector (Figure 1). The wider blade is the negative. Then attach the connector to the instrument.

### Operation - Communications port connections

Use the communications port (A1 - item [9]) to attach an IDOS Universal Measurement Module (UMM) or an RS232 device.

#### • IDOS Communications

When you attach the cable from a UMM (Figure 3), the instrument automatically changes the menus to give you all the applicable options (Table 2).

#### • RS232 Communications

Use an RS232 cable (A1 - item [9a]) to transmit all the Snapshot data to a PC or a printer (Table 4).

### Operation - Measure temperature

To measure temperature:

1. Connect the applicable thermocouples (Figure 1/2) and, if necessary, adjust the *Set Up* (Table 1).
2. Select a *Temperature* input task from *Select Task* (Table 2) and, if necessary, adjust the *Settings* (Table 3).

If the display shows <<<< or >>>> :

- Make sure that the wires and the sensor are serviceable.

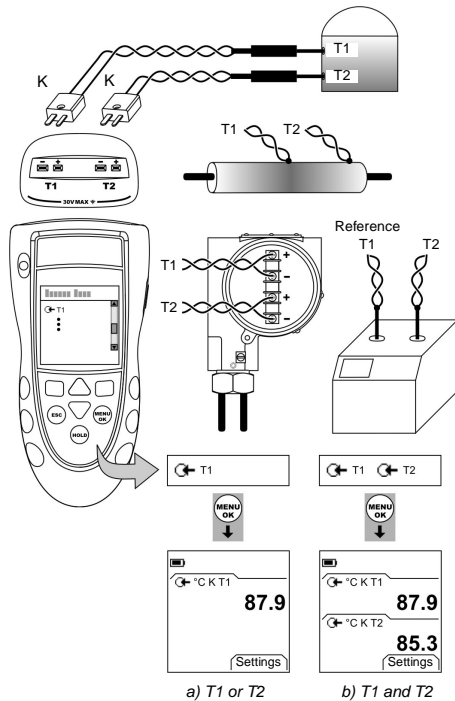
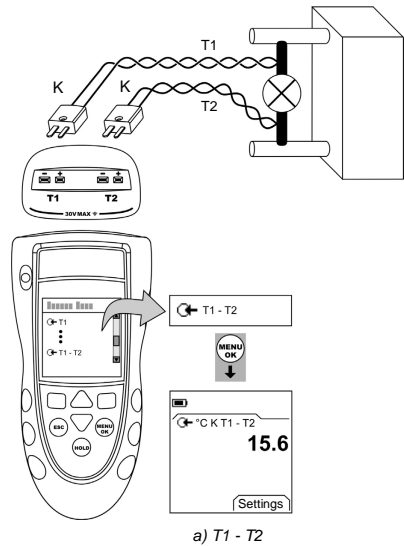


Figure 1: Example configurations - To measure the temperature with one or two thermocouples

The examples in Figure 1 show how to compare temperatures or measure different temperatures in a system.

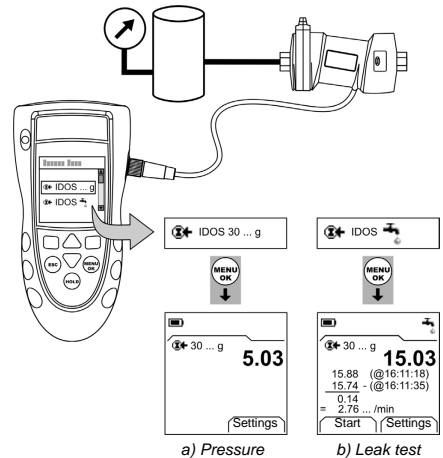


a) T1 - T2

Figure 2: Example configuration - To measure the temperature difference

### Operation - IDOS Pressure measurements

UMM - Pressure options only. Read all the instructions supplied with the UMM and then use the specified procedures to connect it (Figure 3/4).



a) Pressure

b) Leak test

Figure 3: Example configuration - Pressure measurement with a UMM

When the UMM is connected, make the necessary pressure selections.

### IDOS - Measure the pressure

To measure the pressure:

1. Select the applicable pressure task from *Select Task* (Table 2) and, if necessary, adjust the *Set Up* (Table 1), and the *Settings* (Table 3).
2. If necessary, do a zero correction (Table 3).

To measure pressure and temperature (Figure 4), use the same procedure.

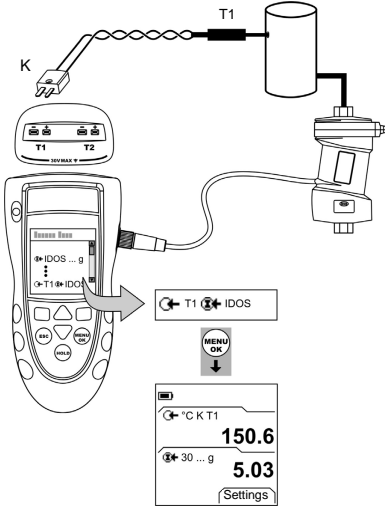


Figure 4: Example configuration - To measure pressure and temperature

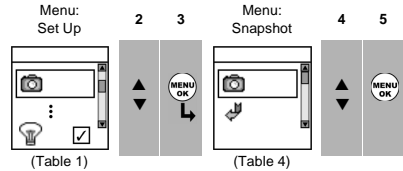
### IDOS - Leak test

To do a leak test on a pressure system:

1. Select an applicable leak test from *Select Task* (Table 2) and, if necessary, adjust the *Set Up* (Table 1), and the *Settings* (Table 3).
2. Set the period for the leak test (Table 3).
3. If necessary, do a zero correction (Table 3).
4. To start the leak test, select *Start* (■ ■). When the test is finished, the instrument calculates the leak rate in the applicable units/minute.

### Operation - Use the Snapshot functions

Use *Snapshot* to record up to 1000 displays then examine the results on the display, or transmit all the data to a PC or printer (Figure 5).



If there is additional data for a menu option, select *Settings* (■ ■) to see the values that are set up. If necessary, adjust the values.

Table 4: Snapshot functions

Options	Description
	To set up a file name (refer to "To start") and to select the <i>Snapshot</i> method:
	Use this option to record an individual display each time you press HOLD.
	Use this option to record the displays at specified intervals of time. Press HOLD to start. <i>Additional data:</i> Select <i>Settings</i> (■ ■)
	<i>Off - Snapshot</i> is off
	To show the available <i>Snapshot</i> data on the display. Use these keys: ▲, ▼, MENU/OK
	To transmit all the <i>Snapshot</i> data to a PC or a printer (Figure 5).
	To erase all the <i>Snapshot</i> data.
	To show the amount of memory used (%). Total memory = 12 288 bytes Capacity = 1000 displays (one measurement) Capacity = 750 displays (two measurements) <b>Example:</b> One file = 96 bytes (no <i>Settings</i> ) For each display in the file: Date/Time = 8 bytes; Each value = 4 bytes One display (One measurement) = 12 bytes

### Snapshot - Use the Snapshot data

Use HOLD to record the data (Table 4). When you have sufficient records, select *Stop Log* (■ ■). You can then read the data back on the display or transmit it to a PC or printer.

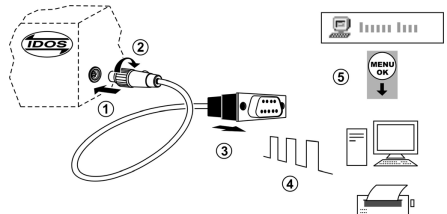


Figure 5: (Part of figure) Procedure to transmit the Snapshot data



Step	Procedure
①, ②	A1 - Item [9a] (Optional): Connect the 5-pin connector to the IDOS instrument.
③	A1 - Item [9a] (Optional): Connect the 9-pin connector to the serial port on the PC or to a serial printer (refer to the PC or printer instructions).
④	PC: Make sure that Windows® HyperTerminal or similar program is set up to use the specified data format (refer to your PC on-line Help).
	Serial printer: Make sure that the printer can use the specified data format.
	<b>Data format</b> Baud rate: 19200                      Data bits: 8 Parity: None                              Stop bits: 1 Software handshake: Xon/Xoff Flow Control ASCII format text; Comma delimited
⑤	Transmit the data to the PC or printer (Table 4).
	PC: Use Windows® HyperTerminal or a similar program to make a text file. You can then import the text file into a spreadsheet.

Figure 3. (Part of figure) Procedure to transmit the Snapshot data  
**Snapshot - Contents of the Snapshot data**

Model	820		
Serial No	8200000001		
Calibration due	01/01/2004		
Tag	H2O-1		
Task Id	110		
T1 in			
Date	Time	°C K T1	
08/07/2004	12:06:44	27.6	
08/07/2004	12:06:46	27.2	
Tag	B145		
Task Id	164		
T1 In	Tare On		
T2 In	Filter On	Tare On	
Date	Time	°C K T1	°C K T2
08/07/2004	14:41:36	32.5	32.4
08/07/2004	14:41:38	32.5	32.4
08/07/2004	14:41:41	32.4	32.5

Figure 6: Example Snapshot data

## Maintenance

This section gives procedures to maintain the unit in a good condition. Return the instrument to the supplier for all repairs.

### Maintenance – Clean the unit

Clean the case with a moist, lint-free cloth and a weak detergent. Do not use solvents or abrasive materials.

### Maintenance – Replace the batteries **B1**

To replace the batteries, refer to B1. Then re-attach the cover. Make sure that the time and date are correct. The calibration facility uses the date to give service and calibration messages. All the other configuration options stay in memory.

### Maintenance – Recalibrate the unit

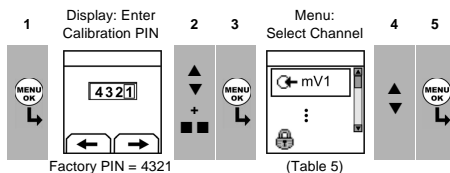
Note: GE Druck can provide a calibration service that is traceable to international standards.

Before you start the calibration, make sure that the time and date are correct (Table 1).

To get accurate results, do the calibration in stable temperature conditions, and to the applicable calibration standards.

Selection sequence:

► Select Task (Table 2) ► Set Up (Table 1) ► Calibration ►.



When you select a channel, the display shows the applicable instructions to complete the calibration.

Table 5: Calibration options

Options	Description
mV...	To calibrate the specified thermocouple channel.
CJ...	To calibrate the specified cold junction channel.
IDOS ...	UMM - Pressure only. To calibrate the specified IDOS channel. Refer to the UMM specification
	To set the date for the next calibration. After the specified calibration date, there is a warning message. There is a selection box to stop the warning.
	To change the calibration PIN (Personal Identification Number).

When the calibration is complete, select *Calibration Due* and set the new calibration date.

### Calibration: Measure mV

The specified accuracy (refer to "Specification") includes an allowance for temperature changes, reading stability for one year, and the uncertainty of the standard used for calibration. GE Druck recommend that you return the instrument to the manufacturer or an approved service agent for calibration. If you use an alternative calibration facility, make sure that it uses these standards:

- Accuracy of the mV calibration equipment: 0.008% reading + 0.003% FS or better.
- Calibration limit for the instrument (mV measure): 0.01% reading + 4 µV or better.

## Specification data

All accuracy statements are for one year.

### Specification - General

Languages	English [Default]
Operating temperature	14 ... 122°F (-10 ... 50°C)
Storage temperature	-4 ... 140°F (-20 ... 60°C)
Humidity	0 to 90% without condensation (Def Stan 66-31, 8.6 cat III)
Shock/Vibration	BS EN 61010:2001; Def Stan 66-31, 8.4 cat III
EMC	BS EN 61326-1:1998 + A2:2001
Safety	Electrical - BS EN 61010:2001; CE Marked
Size (L: W: H)	7.1 x 3.3 x 2.0 in (180 x 85 x 50 mm)
Weight	14 oz (400 g)
Power supply	3 x AA alkaline batteries
Duration	> 80 hours (Measure), > 10 hours (24 V Source at 12.5 mA)

### Specification - Temperature ranges

Thermocouple type	Standard	Range °F	Range °C	Accuracy °F *	Accuracy °C *
K	IEC 584	-454 ..... -328	-270 ..... -200	3.6	2.0
K	IEC 584	-328 ... 2498	-200 ... 1370	1.1	0.6
J	IEC 584	-346 ... 2192	-210 ... 1200	0.9	0.5
T	IEC 584	-454 ..... -292	-270 ..... -180	2.5	1.4
T	IEC 584	-292 ..... -94	-180 ..... -70	0.9	0.5
T	IEC 584	-94 ..... 752	-70 ..... 400	0.6	0.3
B	IEC 584	122 ..... 932	50 ..... 500	7.2	4.0
B	IEC 584	932 ... 2192	500 ... 1200	3.6	2.0
B	IEC 584	2192 ... 3308	1200 ... 1820	1.8	1.0
R	IEC 584	-58 ..... 32	-50 ..... 0	5.4	3.0
R	IEC 584	32 ..... 572	0 ..... 300	3.6	2.0
R	IEC 584	572 ... 3216	300 ... 1769	1.8	1.0
S	IEC 584	-58 ..... 32	-50 ..... 0	4.5	2.5
S	IEC 584	32 ..... 212	0 ..... 100	3.4	1.9
S	IEC 584	212 ... 3216	100 ... 1769	2.5	1.4
E	IEC 584	-454 ..... -238	-270 ..... -150	1.6	0.9
E	IEC 584	-238 ... 1832	-150 ... 1000	0.7	0.4
N	IEC 584	-454 ..... -4	-270 ..... -20	1.8	1.0
N	IEC 584	-4 ... 2372	-20 ... 1300	1.1	0.6
L	DIN 43710	-328 ... 1652	-200 ... 900	0.6	0.3
U	DIN 43710	-328 ..... 212	-200 ..... 100	0.9	0.5
U	DIN 43710	212 ... 1112	100 ..... 600	0.6	0.3
C		32 ... 2732	0 ... 1500	1.8	1.0
C		2732 ... 3632	1500 ... 2000	2.5	1.4
C		3632 ... 4208	2000 ... 2320	3.4	1.9
D		32 ... 3092	0 ... 1700	1.8	1.0
D		3092 ... 3992	1700 ... 2200	2.9	1.6
D		3992 ... 4523	2200 ... 2495	6.5	3.6

#### \*Cold Junction (CJ) error (Maximum):

Range 10 ... 30°C (50° ... 86°F) = 0.2°C (0.4°F)

Add 0.01° CJ error / ° ambient temperature change for ranges: 14 ... 50°F, 86 ... 122°F  
(-10 ... 10°C, 30 ... 50°C)

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